RHODE ISLAND DEPARTMENT OF HEALTH
DIVISION OF DISEASE PREVENTION AND CONTROL
OFFICE OF COMMUNICABLE DISEASES

WEST NILE VIRUS SURVEILLANCE FINAL REPORT
2002 SEASON

FEBRUARY 2003

WEST NILE VIRUS SURVEILLANCE, 2002

BACKGROUND

Since 2000, the Rhode Island Department of Health (HEALTH) in partnership with the Department of Environmental Management (DEM) has enhanced their arbovirus surveillance system and control programs, through a cooperative agreement with the Centers for Disease Control and Prevention.

RHODE ISLAND METHODS:

Avian surveillance

Dead bird sightings were reported by the public and selected groups by phone from mid-May through mid-October to DEM, Office of Mosquito Abatement Coordination (MAC), along with date of sighting, location, and description and number of birds. DEM mapped locations of the birds reported in order to assess potential hotspots for additional mosquito trapping and testing. Only a sample of dead crows and bluejays that met specific criteria (sick with neurological symptoms such as staggering or tilted head, or those that have been dead less than 24 hours and have no obvious signs of injury) were picked up and tested for the West Nile virus. Birds meeting testing criteria were transported daily to the HEALTH Laboratory for daily necropsies. PCR assays were conducted at the HEALTH Laboratory. Starting August 22, 2002, only a sample of dead birds, from cities and towns where infection was not clearly established, were tested to confirm WNV infection. Approximately 414 birds were not retrieved after the town sampling method was instituted. Dead bird surveillance ceased on October 16, 2002.

Mosquito surveillance

From May 28 to October 6, 2002 approximately 27 trap sites were set weekly with CO2-baited CDC light traps and/or gravid traps. Overnight mosquito collections were done and females were sorted by species into groups of 50 or less. Trapping was expanded where "clusters" of WNV-positive birds were found, positive mosquito pools, or if human cases were detected. Up to 120 pools were assayed (via RT-PCR and cell culture, with IFA confirmation) weekly for WNV, EEE, and other selected viruses at the HEALTH Laboratory. Mosquito surveillance was halted on October 8, 2002.

Veterinary surveillance

Veterinarians are required to report any suspected animal cases with neurological illnesses to DEM, Office of Agriculture. The State Veterinarian assists community veterinarians to arrange testing for WNV or EEE in horses that have severe neurological disease.

Equines that have clinical symptoms and are positive to IgM Capture Elisa on serum or cerebrospinal fluid are considered a confirmed positive case. Equine will not demonstrate an IgM response from vaccination. Only natural exposure can produce IgM Antibody.

Human surveillance

To identify human illness caused by West Nile Virus, Rhode Island physicians, hospitals, and laboratories are required to report patients with any of the following syndromes immediately to HEALTH Office of Communicable Diseases (OCD). The syndromes include viral encephalitis (any age), or aseptic or suspect viral meningitis over the age of 17 years, or Guillain-Barré syndrome. To enhance reporting, guidance was provided in May 2002, to Rhode Island hospital infection control

practitioners at their monthly meeting, by the Consultant Public Health Nurse (surveillance program manager), who is a member of the group and a superb liaison for institutional reporting.

When reports are received, the cerebrospinal fluid and/or serum specimens are case managed to the HEALTH Laboratory for arboviral testing. In an effort to classify cases of WNV, a system was set up for collecting convalescent specimens on all patients meeting the initial case criteria for aseptic meningitis. A large commercial laboratory was identified and agreed to provide follow-up serum collections. HEALTH was billed for this service and the commercial laboratory forwarded the serum to the State Laboratory for convalescent testing. Nurses from HEALTH, OCD contacted aseptic meningitis cases and coordinated serum collection of suspect cases who were no longer hospitalized.

The HEALTH Laboratory performs IgM and IgG capture ELISA tests for WNV on suspected human cases. All positive WNV specimens undergo plaque reduction neutralization testing at the HEALTH Laboratory and a sample is forwarded to CDC independently for confirmation.

Enhanced surveillance for WNV testing was halted on October 31, 2002, although testing continued to be available at the HEALTH Laboratory upon special request.

RESULTS

Avian Surveillance

From May 28 to October 6, 2002, 1, 441 dead birds were reported to DEM MAC. Of the 1441 birds reported to authorities, 55.5% or 800 birds were classified as crows. See Table 1.

Table1: Avian Surveillance, by county, Rhode Island, 2002

County	Number of dead crows reported	Number of tested crows	Number of positive crows	Number of “other” dead birds reported	Number of tested "other" birds	Number of positive "other" birds
Bristol	119	21	19	52	3	2
Kent	252	53	30	140	9	4
Newport	114	27	22	61	2	1
Providence	292	91	79	241	22	7
Washington	23	6	2	147	15	1
TOTAL	800	198	152	641	51	15

249 birds met the testing criteria and were submitted for testing. Of the 249 avians tested for WNV, 198 were crows and 51 were "other" birds (a detailed table of avian surveillance by species, can be found in the Appendix). A total of 167 birds submitted, tested positive for WNV. 152 crows tested positive and 15 "other" birds positive for WNV included 12 bluejays, one hawk, one mourning dove, and one parakete. The positive birds were reported between June 16, 2002 to October 15, 2002 from 25 towns (Figure 1).

Mosquito Surveillance

A total of 1417 mosquito pools (11,876 mosquitoes) were submitted for arboviral testing in 2002. The distribution of mosquito species collected for testing can be found in Table 2.

Table 2: Mosquito surveillance by species, 2002, Rhode Island			
Scientific Name	Number Pools Collected	Number of Mosquitoes	Number of positive WNV pools (Number in pools)
Aedes cinereus	6	14	
Aedes sp. / Ochlerotatus sp.	13	37	
Aedes vexans	**185**	**953**	**2 pools (3; 3)**
Anopheles punctipennis	83	182	
Anopheles quadrimaculatus s.l.	41	66	
Anopheles sp.	1	1	
Anopheles walkeri	7	14	
Coquillettidia perturbans	182	3291	
Culex pipiens	**126**	**456**	**2 pools (1; 2)**
Culex restuans	43	180	
Culex sp.	69	859	
Culiseta impatiens	23	113	
Culiseta morsitans	38	158	
Culiseta sp.	79	613	
Ochlerotatus aurifer	10	56	
Ochlerotatus canadensis canadensis	90	429	
Ochlerotatus cantator	43	407	
Ochlerotatus excrucians	30	92	
Ochlerotatus intrudens	29	53	
Ochlerotatus japonicus japonicus	26	39	
Ochlerotatus punctor	15	24	
Ochlerotatus sollicitans	73	1565	
Ochlerotatus sticticus	6	7	
Ochlerotatus stimulans	4	5	
Ochlerotatus taeniorhynchus	88	1943	
Ochlerotatus triseriatus	31	178	
Ochlerotatus trivittatus	22	32	
Psorophora ferox	2	2	
Uranotaenia sapphirina	34	106	

Four mosquito pools tested positive for WNV during the 2002 season. The first positive mosquito pool (Culex pipiens) was collected on August 28, 2002 (Figure 1). Three other positive pools were trapped on September 17, 2002; two pools (Aedes vexans and Culex pipiens) were trapped in Providence County, the other positive pool (Aedes vexans) from Bristol County. See Table 3 for the distribution of mosquito pools by county.

Table 3 : Mosquito surveillance by county, 2002, Rhode Island		
County	# WNV Positive pools (Mosquito species)	# pools collected (# mosquitoes in pool)
Bristol	1 (Aedes vexans)	82 pools (274)
Kent	0	154 pools (948)
Newport	0	292 pools (1929)
Providence	3 (Aedes vexans; 2 Culex pipiens)	341 pools (1571)
Washington	0	539 pools (7153)

Veterinary Surveillance
During the 2002 surveillance season, one horse tested positive for West Nile Virus.

The RI DEM was notified October 28, that a horse from Coventry tested positive for WNV. The horse was not vaccinated, demonstrated classic symptoms and tested positive by IgM Capture Elisa. Symptoms were reported to have started on October 17, 2002. Blood was collected on October 17, 2002 and submitted to the Connecticut Veterinary Diagnostic Laboratory on October 22, 2002 with confirmation on October 25. The horse is a 26 year old gelding Arab cross, responded to treatment very well, and recovered fully from WNV. The horse was vaccinated for Rabies and EEE, but not WNV. It is believed that the horse was exposed in the first week to 10 days of October. Since mosquito surveillance was halted, no additional mosquito traps were set; however the State Veterinary visited the farm where the horse was stabled, and apprised the owners of the risk of WNV transmission.

Human Surveillance
In 2002, a total of 95 serum and 69 cerebrospinal fluid specimens from 82 persons were approved and tested by the HEALTH Laboratory.

Eleven cases of viral encephalitis were reported in 2002 and tested for WNV infection. From June 1 to October 15, 2002, 65 cases of aseptic meningitis met the testing criteria for WNV testing. Of the 65 cases of aseptic meningitis identified for WNV testing, 34 cases either refused convalescent testing or were not able to be contacted for convalescent testing.

HEALTH confirmed the state's first human case of West Nile Virus infection in 2002. A 66-year-old female resident of Providence County was diagnosed with West Nile viral infection. This patient was admitted on September 24 with a 10-day history of fever, diarrhea, generalized weakness, and worsening headaches. The febrile period was preceeded by a prodrome of fatigue and loss of appetite. A spinal tap revealed a mild pleocytosis and elevated protein. She tested positive for WN virus in both cerebrospinal fluid (CSF) and serum samples by an IgM-capture enzyme-linked immunosorbent assay (ELISA). She made a rapid recovery over a 5-day period and was discharged home. She gave a history of significant mosquito exposures, but had not traveled beyond Rhode Island and adjoining areas of Massachusetts or Connecticut in the two weeks prior to onset. She was not the recipient of a blood transfusion or organ transplant and had no risk factors other than mosquito bites. This case was reported by the treating clinician as a case of viral meningitis on September 24, to the Office of Communicable Disease.

A second probable case was also detected during the 2002 season. The case was classified as a West Nile fever case and did not require hospitalization for her illness. The resident of Providence County is in her 60's and became ill during the second week of September. She was likely exposed to infected mosquitoes in early September. She traveled to Vermont two weeks prior to onset of illness, and her occupation predisposes her to outdoor exposures. Positive test results on blood samples were confirmed at the HEALTH Laboratory.

Comparison of National and Rhode Island WNV Surveillance

1999	28 counties in 4 states reported any WNV activity
2000	136 counties in 12 states & DC reported any WNV activity
2001	358 counties in 27 states & DC reported any WNV activity
2002YTD (1/21/2003)	2,480 counties in 43 states & DC reported any WNV activity

Reported Human WNV Disease Cases, United States, 1999-2002*					
Year	Cases	Deaths	States	Counties	Onset Dates
1999	62	7	1	6	August 2-September 24
2000	21	2	3	10	July 20-September 27
2001	66	9	10	40	July 13-December 7
2002 YTD*	3862	248	39 & D.C.	708	May 19-December 14
* 2002 YTD: Provisional data as of 1/21/2003					

Reported Human WNV Disease Cases, Rhode Island, 1999-2002		
Year	Number of persons tested	Number of persons positive for WNV
1999	0	0
2000	42	0
2001	43	0
2002	82	2

WNV Surveillance, US, 1999-2002 YTD*, Summary of Mosquito Data					
Year	# of positive pools	# of species	Earliest + pool	States	Counties
1999	18	6	9/12/99	3	8
2000	515	17	7/7/00	5	38
2001	919	27	5/31/01	16 & D.C.	70
2002 YTD*	6033	29	5/22/02	33 & D.C.	---
* 2002 YTD: Provisional data as of 1/21/2003					

WNV Surveillance, Rhode Island, 1999-2002, Summary of Mosquito Data					
Year	# of collected pools	# positive pools	Number of species	Earliest + pool	Counties
1999	0	0	0	0	0
2000	1113	0	0	0	0
2001	1856	14	8	7/16/01	3
2002	1417	4	3	8/28/02	2

WNV Surveillance, US, 1999-2002 YTD*, Summary of Dead Bird Data					
Year	# of positive birds	% Crows	% Other	States	Counties
1999	249	90.0 %	10.0 %	4	28
2000	4305	88.8 %	11.2 %	12 & D.C.	136
2001	7332	70.3 %	29.7 %	26 & D.C.	328
2002 YTD*	15,745	53 %	47 %	42 & D.C.	---
* 2002 YTD: Provisional data as of 1/21/2003					

WNV Surveillance, Rhode Island, 1999-2002, Summary of Dead Bird Data						
Year	Number of birds reported	Number of birds positive	% Crows	% Other birds	Earliest + reported	Counties
1999	0	0	0	0	0	0
2000	1466	88	79.5 %	20.5 %	8/14/00	4
2001	1324	245	83.3 %	16.7 %	5/30/01	5
2002	1441	167	91.0 %	9.0 %	6/17/02	5

WNV Surveillance, US, 1999-2002 YTD*, Summary of Equine Data			
Year	# of equine cases	States	Counties
1999	25	1	2
2000	63	6	26
2001	731	19	125
2002 YTD*	12038	39	1678
* 2002 YTD: Provisional data as of 1/21/2003			

WNV Surveillance, Rhode Island, 1999-2002, Summary of Equine Data			
Year	# of equine cases	County	Month of onset
1999	0	---	---
2000	1	Washington	August
2001	0	---	
2002	1	Kent County	October

APPENDIX

Table: Distribution of avians tested, Rhode Island, 2000-2002			
Species	2000	2001	2002
American Kestrel	1		
Bald Eagle		1	
Barred owl			1
Black bird		1	
Bluejay	48	56	24
Broadwinged Hawk	1		
Brow Creeper	1		
Brow Thrasher	2		
Cardinal	2		1
Catbird	5	2	1
Cedar waxwing		1	
Chicken, R.I. Red			2
Cockateel		1	1
Cooper's Hawk			
Cowbird	1		
Crow	138	262	198
Crowbird	1		
Duck	1		
Finch	1	2	
Flicker	1		
Gold finch	1	2	
Grackle	15	19	3
Great Cormorant	2	1	
Gull	5		
Hawk	5	3	4
House finch		2	
Laughing gull		4	
Mockingbird	4		
Mourning dove	11	6	4
Mute swan			1
Northern Raven	1		
Orchid Oriole	1		
Osprey		1	1
Parakete		2	1
Parrot			2
Peacock	1		
Pigeon	1		
Red tailed hawk	3	1	1
Robin	12	2	1
Rock dove		7	
Sandpiper			2
Screech Owl		1	
Sea gull	1		1
Sharp-shinned hawk	2	1	
Sparrow Sp.	29	7	
Starling	11	3	
Swaenson's Hawk	1		
Thrush	1	2	
Warbler	1		
Woodpecker	3		

Table: Distribution of mosquito species tested, Rhode Island, 2001-2002				
Scientific Name	Number Trapped and Tested, 2001	Number WNV positive, 2001	Number Trapped and Tested, 2002	Number WNV positive, 2002
Aedes cinereus	108		14	
Aedes sp. / Ochlerotatus sp.	2752		37	
Aedes vexans	**1310**	**1 pool-(2) mosquitoes**	**953**	**2 pools- (3) & (3) mosquitoes**
Anopheles crucians	9		0	
Anopheles punctipennis	**512**	**1 pool-(2) mosquitoes**	182	
Anopheles quadrimaculatus s.l.	**96**	**2 pools- (3) & (1) mosquitoes**	66	
Anopheles sp.	9		1	
Anopheles walkeri	22		14	
Coquillettidia perturbans	**3022**	**2 pools- (3) & (2) mosquitoes**	3291	
Culex pipiens	1		**456**	**2 pools- (2) & (1) mosquitoes**
Culex restuans	3		180	
Culex sp.	**1377**	**3 pools-(3) , (1) & (5) mosquitoes**	859	
Culiseta impatiens	3		113	
Culiseta melanura	1		0	
Culiseta morsitans	14		158	
Culiseta sp.	**3430**	**1 pool- (3) mosquitoes**	613	
Ochlerotatus abserratus	108		0	
Ochlerotatus atropalpus	2		0	
Ochlerotatus aurifer	31		56	
Ochlerotatus canadensis	**572**	**2 pools- (3) & (1) mosquitoes**	429	
Ochlerotatus cantator	**464**	**1 pool- (2) mosquitoes**	407	
Ochlerotatus excrucians	82		92	
Ochlerotatus intrudens	191		53	
Ochlerotatus japonicus	41		39	
Ochlerotatus provocans	2		0	
Ochlerotatus punctor	29		24	
Ochlerotatus sollicitans	178		1565	
Ochlerotatus sticticus	16		7	
Ochlerotatus stimulans	11		5	
Ochlerotatus taeniorhynchus	972		1943	
Ochlerotatus triseriatus	105		178	
Ochlerotatus trivittatus	69		32	
Orthopodomyia signifera	**1**	**1 pool-(1) mosquito**	0	
Psorophora ferox	58		2	
Uranotaenia sapphirina	45		106	

Figure 1: WNV Surveillance, 2002, Rhode Island